I claim:

1. A drug discovery method for identifying a compound that modulates the induction of PSD-95 by the Nrg-1/Eos signaling pathway comprising:

- (i) contacting one or more test compounds with Nrg-ICD or a portion thereof, wherein the Nrg-ICD or portion thereof is encoded by a nucleic acid that hybridizes to a nucleic acid having SEQ ID NO: 1 in 5.times.SSC at 42.degree. C.; and (ii) identifying the binding between the one or more test compounds and Nrg-ICD or a portion thereof.
- 2. The method of claim 1, further comprising the step of exposing a cell to an identified compound from step (ii) and determining whether the identified compound modulates translocation of Nrg-ICD into the nucleus of the cell.
- 3. The method of claim 2, wherein modulation of translocation is measured fluorometrically.
- 4. The method of claim 1, further comprising the step of exposing a cell to an identified compound from step (ii) and determining whether the identified compound binds to Eos.
- 5. A drug discovery method for identifying a compound that modulates . binding of Nrg-ICD with a binding site of Eos, comprising:
- (i) contacting one or more test compounds with Nrg-ICD or a portion thereof and with at least one binding site of Eos, wherein the Nrg-ICD is encoded by a nucleic acid that hybridizes to a nucleic acid having SEQ ID NO: 1 in 5.times.SSC at 42.degree. C.;
- (ii) contacting Nrg-ICD or a portion thereof with the at least one binding site of Eos in the absence of the one or more test compounds; and
- (iii) identifying a difference in binding between Nrg-ICD or a portion thereof and with the at least one binding site of Eos between the contacting of (i) and the contacting of (ii).
- 6. The method of claim 5, wherein step (i) occurs after step (ii) by adding the one or more test compounds to a solution prepared in step (ii).
- 7. A drug discovery method for identifying a compound that modulates translocation of Nrg-ICD into a cell nucleus, comprising:
 - (i) contacting a cell with one or more test compounds; and
 - (ii) detecting movement of Nrg-ICD from the cell cytoplasm into the cell nucleus.
- 8. The method of claim 7, wherein movement of Nrg-ICD is indirectly detected by measuring the amount of Nrg-ICD in the cell nucleus after step (i).

9. The method of claim 7, wherein detection is carried out fluorometrically.

- 10. The method of claim 7, wherein the Nrg-ICD is produced transgenically within the cell.
- 11. The method of claim 9, wherein the Nrg-ICD comprises a conjugate of a polypeptide encoded by a sequence that is at least 90% homologous with SEQ ID NO: 1 and a detectable label.
- 12. The method of claim 9, wherein the Nrg-ICD comprises a conjugate of a polypeptide encoded by a sequence that is at least 95% homologous with SEQ ID NO: 1 and a detectable label.
- 13. A method for identifying a compound which promotes or inhibits translocation of Nrg-ICD across the nuclear membrane of a cell, comprising:
 (i) transgenically expressing in cells, a polypeptide complex comprising a nuclear localization sequence of Nrg-ICD and a detectable label, wherein the localization sequence of Nrg-ICD is at least 90% homogeneous with a portion that exceeds 20 amino acids of SEQ ID NO: 1; and
- (ii) contacting the cells with test compounds and determining whether a test compound affects translocation of Nrg-ICD across the nuclear membrane of the cell.
- 14. The method of claim 13, wherein the nuclear localization is sequence is selected from the group consisting of SEQ ID NO: 3 [KTKKQRKK] and SEQ ID NO: 4 [PRLREKK].
 - 15. The method of claim 13, wherein the cells are neurons.
- 16. The method of claim 13, wherein the detectable label is selected from the group consisting of green fluorescent protein, a chemilumiphore, an antigenic peptide sequence and a regulatory marker.
- 17. A method for identifying a compound that promotes or inhibits translocation of Nrg-ICD across the nuclear membrane of a cell, comprising:
 (i) transgenically expressing in cells, a polypeptide complex comprising a nuclear localization sequence of Nrg-ICD and a regulatory marker, wherein the localization sequence of Nrg-ICD is at least 90% homogeneous with a portion that exceeds 20 amino acids of SEQ ID NO: 2 and the regulatory marker influences the expression of a gene when present within the nucleus of the cell; and

(ii) contacting the cells with test compounds and determining whether a test compound affects translocation of Nrg-ICD across the nuclear membrane of the cell.

- 18. The method of claim 17, wherein the regulatory marker is selected from the group consisting of a promoter and an enhancer.
- 19. The method of claim 17, wherein the cell nucleus comprises a foreign gene that produces a protein that conveys a selectable trait to the cell and the regulatory marker is a promoter or enhancer of that foreign gene.
- 20. A method for identifying a compound that modulates the proteolysis of Neu-1 to form Nrg-ICD, comprising:
- (i) incubating a cellular membrane form of Neu-1 in the presence of the compound; and
- (ii) detecting the formation of a carboxylic end portion of Neu-1 that is less than 60 kilodaltons in size.
- 21. The method of claim 20, wherein the cellular membrane form of Neu-1 is intact cells.
- 22. The method of claim 20, wherein the carboxylic end portion of Neu-1 is approximately 35 kilodaltons in size.
- 23. The method of claim 20, wherein detection of the carboxylic end portion comprises detection of an immunologically reactive water soluble polypeptide.
- 24. A method for identifying a compound that modulates gene activity by binding to an Ikaous 1/2 sequence, comprising:
- (i) providing transgenic cells that contain a reporter gene operably coupled to a promoter that comprises Ikaous 1/2 sequence;
- (ii) contacting the cells with one or more test substances; and
- (iii) detecting the induction of the reporter gene in response to one or more test substances.
 - 25. The method of claim 24, wherein the cells transgenically express Neu-1.
- 26. A fusion polypeptide of a pharmaceutically active compound discovered by the method of any of claims 1 through 22, comprising a first polypeptide portion of between 8 and 50 amino acids long that exhibits binding to Nrg-ICD or Eos and a second polypeptide portion comprising a transporter moiety of between 10 and 20 amino acids long.

27. The fusion compound of claim 26, wherein the second polypeptide portion has a sequence that is selected from the group consisting of SEQ ID NO:4 [YGRKKRRQRRR] and SEQ ID NO: 5 [RQIKIWFQNRRMKWKK].

- 28. The fusion polypeptide of claim 26, wherein the pharmaceutically active compound binds Neu-1
- 29. A method for enhancing learning in an animal, comprising providing to the animal a compound that modulates the formation or translocation of Nrg-ICD into the nucleus of a nerve cell, wherein the compound is a a fusion compound as described in claim 26.
- 30. A method for preventing neuronal excitotoxicity in an animal, comprising providing to the animal a pharmaceutical that attenuates the nuclear signaling pathway of Neu-1
- 31. A transgenic animal with enhanced learning capability, produced by the process of stably incorporating an exogenous Neu-1 gene into the animal and expressing the gene.
- 32. The transgenic animal of claim 31, wherein the added gene is expressed constitutively in nerve cells.
 - 33. An isolated protein complex, comprising primarily of Ng-ICD and Eos.
- 34. A vector that comprises a gene encoding Nrg-ICD and a gene encoding Eos.